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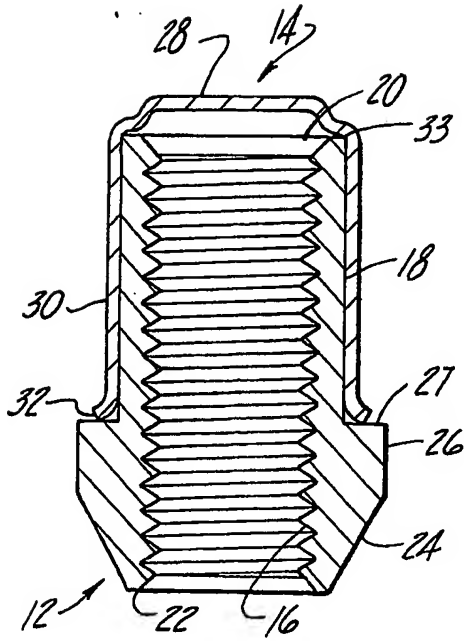


Fig-1
PRIOR ART

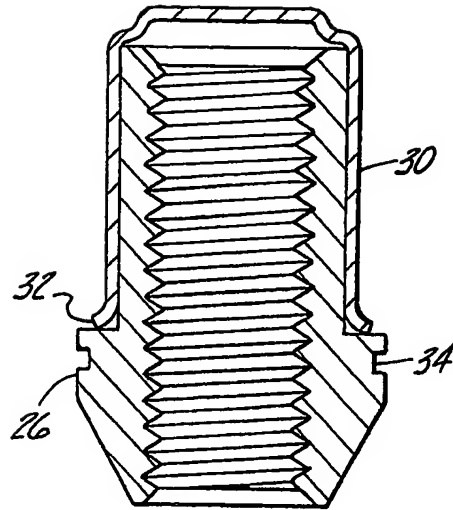


Fig-2
PRIOR ART

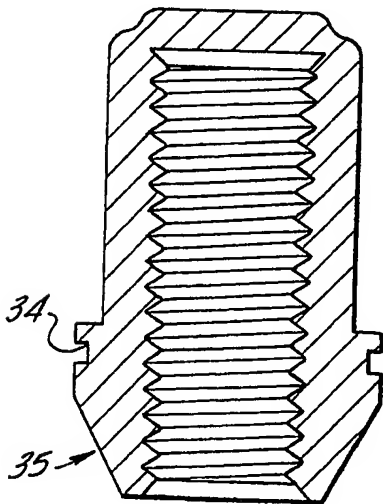


Fig-3
PRIOR ART

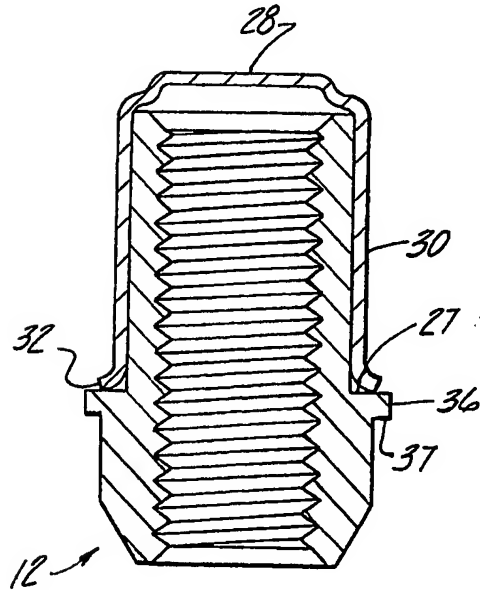
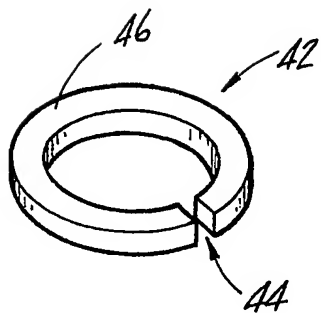
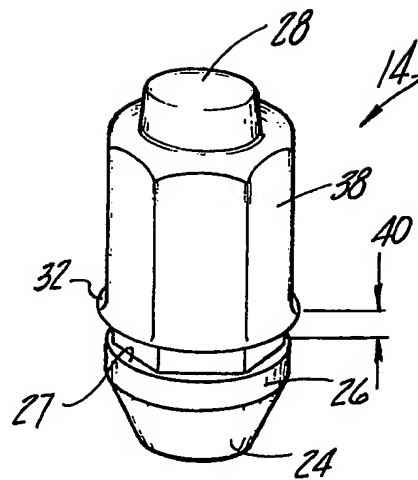
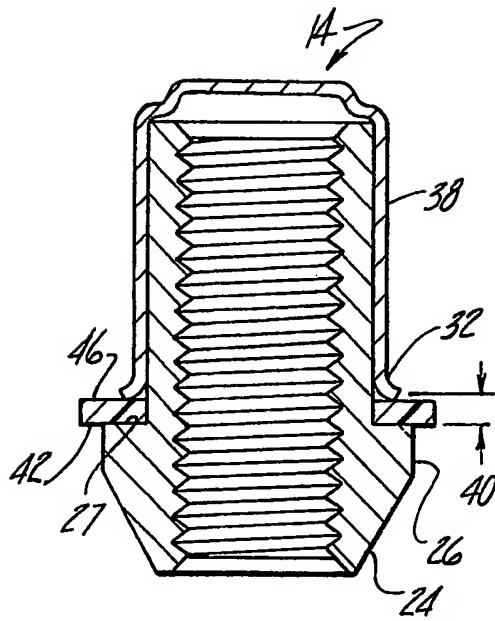


Fig-4
PRIOR ART



SPECIFICATION

Improved wheel nut

5 This invention relates to wheel nuts and, more particularly, to an improved wheel nut for retaining a wheel on a hub and simultaneously retaining a wheel cover or hub cap in position on the wheel.

There were, prior to the present invention, basically three types of wheel nuts, often referred to as wheel lugs, for retaining vehicle wheels on hubs. The "hub" refers to the end of the axle where the wheel is mounted. The hub has a plurality of threaded studs, such as five, extending outwardly therefrom and a wheel, having five apertures, is mounted on the hub by aligning the apertures in the wheel with the studs on the hub. The wheel, of course, is provided with a circumferentially mounted tyre. Once the wheel is mounted on the hub, wheel nuts are threaded onto the studs to retain the wheel on the hub. A decorative wheel cover may then be removably force fitted onto the wheel.

The first type of wheel nut heretofore used was a thin, flat, disc-like steel member having a central threaded bore therethrough. The nut had six peripheral flat surfaces, called wrench flats, and the nut was hexagonal in plan view. This first type of wheel nut is the oldest type which is still in widespread use.

A second type of wheel nut was the decorative wheel nut which was formed as a single piece chrome plated elongated rod-like member. This one-piece chrome plated wheel nut included an internally threaded bore which extended almost the full length of the nut but the bore was closed at one end. This wheel nut also had a plurality of wrench flats, typically six, so that the wheel nut could be tightened onto the conventional stud extending outwardly of the hub to thereby secure the wheel to the hub. This type of chrome plated wheel nut is commercially available.

A third type of wheel nut utilized a steel nut body to which a stainless steel decorative cap was attached. The nut body was similar to the first type of wheel nut including a central threaded bore and a plurality of wrench flats. The decorative cap covered one end of the bore as well as the wrench flats. Thus the cap protected the end of the stud from damage due to weather, impact or the like and, when the capped wheel nuts were threaded on to the studs to secure the wheel to the hub, essentially only the decorative stainless steel cap was visible. The capped wheel nut is also commercially available.

Numerous types of "wheel covers" or "hub caps" have been marketed to enhance the appearance of the wheel mounted on the hub. Where the first type of lug nuts are utilized, the wheel cover or hub cap is attached to the wheel to hide and protect the nuts and the studs. Where either the one-piece chrome plated wheel nuts or the capped wheel nuts are utilized, two alternate types of covers were used. In the first type, there were a plurality of apertures in the wheel cover so that when

the wheel cover is in place on the wheel, the capped wheel nuts (or alternatively the chrome wheel nuts) extend through the apertures in the wheel cover. In the second type there were no apertures in the cover but the cover was of a sufficiently small diameter so that there was no interference between the wheel cover or hub cap and the wheel nuts, and application of the former left the latter exposed.

Typically, the wheel cover or hub cap has a plurality of resilient protrusions which engage the wheel for retaining it on the wheel. Occasionally, however, a wheel cover or hub cap will fall off the wheel when the vehicle is driven on bumpy roads or in the event of improper placement of the wheel cover or hub cap on the wheel such as after changing a tyre or the like.

There have been various attempts to solve the problem of inadvertent removal of (or even theft of) the wheel cover or hub caps. As discussed in greater detail, none of these has been totally satisfactory.

In addition, as wheel covers or hub caps become more decorative and more expensive, a problem has arisen in that many wheel covers or hub caps are stolen since typically a flat-bladed screwdriver may be sufficient to dislodge the wheel cover or hub cap from the wheel. This is especially true with new cars where wheel covers or hub caps are often stolen whilst the car is still with the dealer. Hence many cars are shipped from the factory with wheel covers in the boot or trunk.

According to the present invention there is provided a capped wheel nut of the type including a nut body and a cap secured thereto, the nut body having a central threaded aperture, a first end adapted to engage a wheel, a second end adapted to fit within the cap, and a shoulder intermediate the first and second ends, the cap having a first portion to cover the second end of the nut and a second portion covering the sides of the nut body and terminating in a radially outwardly extending flange, wherein a gap is provided around the periphery of the nut, the gap being generally the distance between the radially outwardly extending flange on the cap and the shoulder on the nut body, and a retaining ring is positioned in the gap and extends radially outwardly beyond the nut body to form a retaining element for a wheel cover or hub cap on a wheel.

When the capped wheel nuts are secured on the studs which extend outwardly from the hub, and with wheel cover or hub cap in place, the latter is positioned between the hub and the retaining ring on each of the wheel nuts. The retaining rings extend radially outwardly a sufficient distance such that the wheel covers may not be removed without first removing each of the capped wheel nuts. While retaining rings have been used with wheel nuts for this purpose, the prior attempts (as discussed in greater detail) have not been totally satisfactory, as will be explained.

In addition, the cap of the capped wheel nut now provides a new function. In the past, the cap served not only as a decorative member but

provided the wrenching flats. Now, according to the principles of the present invention, the cap also functions as a stop member for the retaining ring, thus aiding in maintaining the retaining ring in position.

The invention will now be further described by way of example, with reference to the accompanying drawings, wherein like reference numerals identify corresponding components, and in which:-

Figure 1 is a sectional illustration through a prior art capped wheel nut;

Figure 2 is a sectional illustration through a prior art capped wheel nut which provides for a retaining ring;

Figure 3 is a sectional illustration through a prior art one piece nut which provides for a retaining ring;

Figure 4 is a sectional illustration through a prior art capped wheel nut which includes a retaining flange on the nut body;

Figure 5 is a sectional view of a capped wheel nut including a retaining ring according to the present invention;

Figure 6 is a perspective illustration of the capped wheel nut of *Figure 5* with the retaining ring removed for illustrative purposes; and

Figure 7 is a perspective illustration of the retaining ring utilized with the capped wheel nut of the present invention, as well as with the wheel nut of *Figures 2 and 3*.

With reference to *Figure 1*, a capped wheel nut is illustrated in sectional view. The capped wheel nut may be of the type disclosed in U.S. Patent Specification No.4,123,961. Typically the capped wheel nut includes a steel nut body 12 and a stainless steel cap 14.

The nut body 12, often called a nut insert, has a central threaded aperture 16 and a plurality of wrench flats 18 arranged generally parallel to the elongated axis of the nut body. It is conventional to provide six such wrench flats and thus in an end view the nut body is of hexagonal configuration.

The nut body 12 has first and second ends 20, 22 and the second end is typically formed with a conical surface 24 that is adapted to mate with the conical depressions typically formed around stud holes in vehicle wheels. The conical section terminates in a short cylindrical land 26.

At the top of the land 26 the nut body may be provided with a shoulder 27. The land 26 is like a radial flange on the nut body.

The nut body 12 is covered by a sheath or cap preferably formed of stainless steel. The cap includes a top 28 which may be domed, flat or recessed. The top 28 covers the first end 20 of the nut body and a downwardly extending skirt portion 30 which extends over the wrench flats 18. The skirt portion 30 may be configured to correspond to the wrench flats 18. The free end 32 of the skirt

portion of the cap, i.e., the end opposite the top, may extend radially outwardly a short distance and may correspond in outside diameter to the outside diameter of the land portion 26 of the nut body.

There will be some nominal clearance between the free end 32 of the cap and the shoulder 27 on the

nut body. Typically, that clearance would be less than 0.1 millimetres and is provided purely as a clearance. The cap may preferably be secured to the nut body by welding as at 33. The structure heretofore described with reference to *Figure 1* is considered to prior art.

With reference to *Figure 2*, a prior art approach to solving the problem of retaining the wheel cover on the wheel will now be described. This prior art approach envisions machining a circumferential groove 34 in the land 26 on the nut body so that a retaining ring may be placed in the groove 34. The retaining ring would extend outwardly from the groove and would retain the wheel cover against both accidental dislodgement and deliberate removal unless the wheel nuts were removed.

There are numerous problems with this prior art approach, not the least of which is the expense involved in machining the groove in the nut body.

A second approach to retaining the wheel cover on the wheel has been suggested for use with a one-piece, chrome-plated wheel nut 35. Specifically the one-piece nut, as illustrated in *Figure 3*, is initially formed with a groove 34. Again a retaining ring is positioned in the groove. While this type of device has worked satisfactorily, it must be understood that one-piece chrome-plated wheel nuts are relatively expensive, and have other undesirable features. Thus the one-piece nut is not totally satisfactory.

Figure 4 illustrates yet another prior art approach where the nut body 12 includes a radial flange 36 in place of the land 26. The flange 36 co-operates with a clip or the like on the wheel cover so that the wheel cover is not inadvertently removed. The flange and clip, however, may not provide a full 360° bearing surface on the underside 37 of the flange where contact is made with the cover.

With reference to *Figures 5 and 6*, the present invention will now be explained. The cap 14 of the wheel nut is generally similar to the cap 14 of *Figures 1, 2 and 4* except that the skirt portion 38 is shorter in an axial distance than the corresponding skirt portion 30 of the cap of *Figures 1 and 2*. The skirt portion 38 is provided with a radially outwardly extending flange 32, corresponding to the flange 32 on the skirt portion 30 of the cap of *Figures 1, 2 and 4*. Thus an axial gap 40 is provided between the free end 32 of the cap and the shoulder 27 of the nut body 12. This axial gap, in the preferred embodiment, is sufficient to allow for placement of the retaining ring therein. By way of example and illustration, a retaining ring previously suggested for use with the device of *Figure 2*, and proposed for the present invention has an approximate thickness of about 3.0 millimetres.

With reference to *Figures 5 and 7*, the retaining ring 42 is illustrated. The retaining ring may be made of nylon and has a thickness of about 3.0 millimetres. The retaining ring may be a split ring retainer, such as the type having a split 44 through the thickness of the ring, so that the ring may be snapped in place within the axial gap 40. The ring as described is also considered to be prior art because such ring has been suggested for use in the

device of Figures 2 and 3. In such prior uses the retaining ring extends radially outwardly beyond the nut body for retaining the wheel cover on the nut.

- 5 When the ring 42 is placed within the axial gap 40, the ring, of course, extends radially outwardly beyond the land 26 of the nut body as is necessary to enable the retaining ring to prevent the wheel cover from being removed. However, according to the principles of the present invention, the retain-
10 ing ring and particularly the upper surface 46 thereof may abut against the free end 32 of the cap such that the cap, which is secured to the nut body, functions to support the ring, in the nature
15 of a stop member, against substantial axial movement.

In comparison to the one-piece chrome-plated nut body including a retaining ring which is part of the prior art, it should be immediately appreciated
20 that the present invention provides an improved wheel nut and wheel cover retainer system.

CLAIMS

- 25 1. A capped wheel nut of the type including a nut body and a cap secured thereto, the nut body having a central threaded aperture, a first end adapted to engage a wheel, a second end adapted to fit within the cap, and a shoulder intermediate
30 the first and second ends, the cap having a first portion to cover the second end of the nut and a second portion covering the sides of the nut body and terminating in a radially outwardly extending flange, wherein a gap is provided around the pe-
35 riphery of the nut, the gap being generally the distance between the radially outwardly extending flange on the cap and the shoulder on the nut body, and a retaining ring is positioned in the gap and extends radially outwardly beyond the nut
40 body to form a retaining element for a wheel cover or hub cap on a wheel.

2. A capped wheel nut as claimed in claim 1, wherein the retaining ring is of a thickness such that it abuts against the radially outwardly extend-
45 ing flange of the cap.

3. A capped wheel nut as claimed in claim 1 or 2, wherein the cap is welded to the nut body.

4. A capped wheel nut as claimed in claim 1, 2 or 3, wherein the nut body has polygonal sides
50 and the cap second portion extends over the polygonal sides.

5. A capped wheel nut as claimed in claim 4, wherein the nut body has six sides and the cap second portion has six sides.

55 6. A capped wheel nut as claimed in any one of claims 1 to 5, wherein the cap is formed of stainless steel.

7. A capped wheel nut as claimed in any one of claims 1 to 6, wherein the retaining ring is formed
60 of nylon.

8. A capped wheel nut as claimed in any one of claims 1 to 7, wherein the retaining ring is removably positioned in the gap.

9. A capped wheel nut of the type including a
65 nut body having a central threaded aperture. a first

end, a second end, and a generally outwardly extending portion therebetween, and a cap for the nut body, the cap having a first section covering one end of the nut body and a second section covering at least a portion of the nut body and terminating in a radially outwardly extending flange, wherein a gap is provided around the periphery of the nut, the gap being the distance between the radially outwardly extending flange on the cap and the outwardly extending portion of the nut body,
70 and a retaining ring is positioned in the gap and extends radially outwardly beyond the nut body to form a retaining element for a wheel cover or hub cap on a wheel.

80 10. A capped wheel nut as claimed in claim 9, wherein the radially outwardly extending flange on the cap extends radially outwardly a lesser distance than does the retaining ring.

11. A capped wheel nut of the type including a
85 nut body having a central threaded aperture, polygonal sides, first and second ends, and a generally outwardly extending portion therebetween, the first end being adapted to engage a wheel, and a cap having a first section to extend over the second end of the nut body and a second section extending over the polygonal sides and terminating in a radial flange, wherein a gap is provided around the periphery of the capped wheel nut, the gap being the distance between the outwardly extending portion of the nut body and the flange on the cap, and a retaining ring is positioned in the gap and extends radially outwardly beyond the nut body for retaining a wheel cover or hub cap on a wheel against inadvertent removal.

100 12. A capped wheel nut as claimed in claim 11, wherein the retaining ring is removably positioned in the gap.

13. A capped wheel nut as claimed in any one of claims 1 to 12, wherein the retaining ring is trapped between the cap and the nut body to preclude substantial axial movement of the retaining ring.

14. A capped wheel nut as claimed in any one of claims 1 to 13, wherein the gap is an axial gap.

110 15. A capped wheel nut substantially as herein described with reference to and as illustrated in the accompanying drawings.